RESULT LIST
1 result found in the Worldwide database for:
WO9401645 (priority or application number or publication number)
(Results are sorted by date of upload in database)

1 IMPROVEMENTS RELATING TO LOCKS
Publication info: WO9401645 - 1994-01-20

Data supplied from the ***esp@cenet*** database - Worldwide

IMPROVEMENTS RELATING TO LOCKS

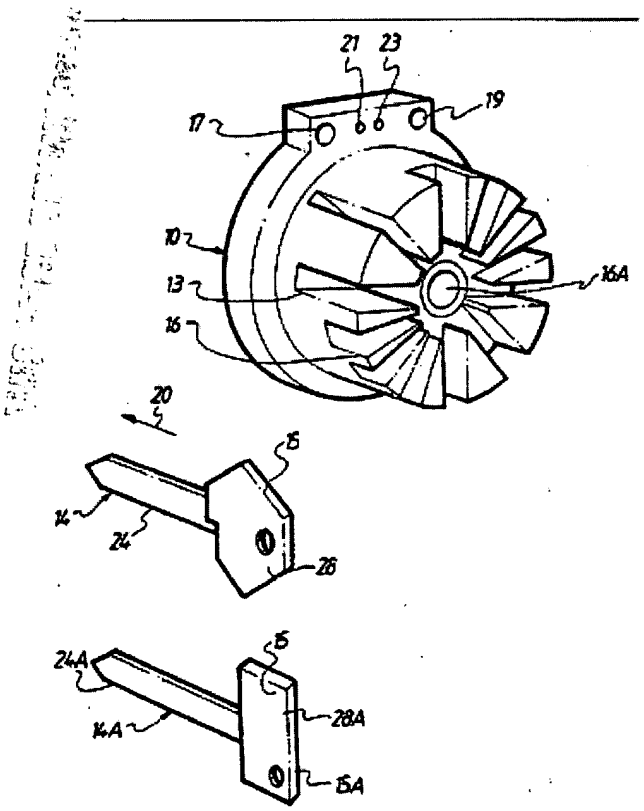
Patent number: WO9401645
Publication date: 1994-01-20
Inventor: WOOD ERIC (GB)
Applicant: SMART LOCK LIMITED (GB); WOOD ERIC (GB)
Classification:
- international: (IPC1-7): E05B47/00
- european: E05B47/00D; E05B47/06; G07C9/00E12G
Application number: WO1993GB01410 19930705
Priority number(s): GB19920014257 19920704; GB19930003708 19930224

Cited documents:
DE3122064
AT361798B
FR2561703
FR2669368
DE3244566
more >>

Report a data error here

Abstract of **WO9401645**

A lock (10) and key (14, 14A) mechanism for doors (12) and the like, whereas the lock electromagnetically recognises a key (14, 14A) when inserted into its bore. The key barrels contain a random distribution of magnetic particles in a non-magnetic aggregate, and each key (14, 14A) is unique. The lock contains an induction coil (29) which outputs a code signal to a memory (22) device on insertion of a key (14, 14A). The memory (12) stores the outputs of newly-inserted keys (14, 14A) to allow future operation of the lock (10), and a key (14, 14A) can be cancelled from the memory (12) to prevent future operation of the lock (10) thereby.



PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :		(11) International Publication Number:
E05B 47/00	A1	WO 94/01645
		(43) International Publication Date: 20 January 1994 (20.01.94)

(21) International Application Number: PCT/GB93/01410

(22) International Filing Date: 5 July 1993 (05.07.93)

(30) Priority data:

9214257.9	4 July 1992 (04.07.92)	GB
9303708.3	24 February 1993 (24.02.93)	GB

(71) Applicant *(for all designated States except US)*: SMART LOCK LIMITED [GB/GB]; Witches Hill, Arbory Road, Castletown, Isle of Man (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)* : WOOD, Eric [GB/GB]; Thie-Yuan, Christian Avenue, Kirk Michael, Isle of Man (GB).

(74) Agent: BAILEY WALSH & CO.; 5 York Place, Leeds LS1 2SD (GB).

(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

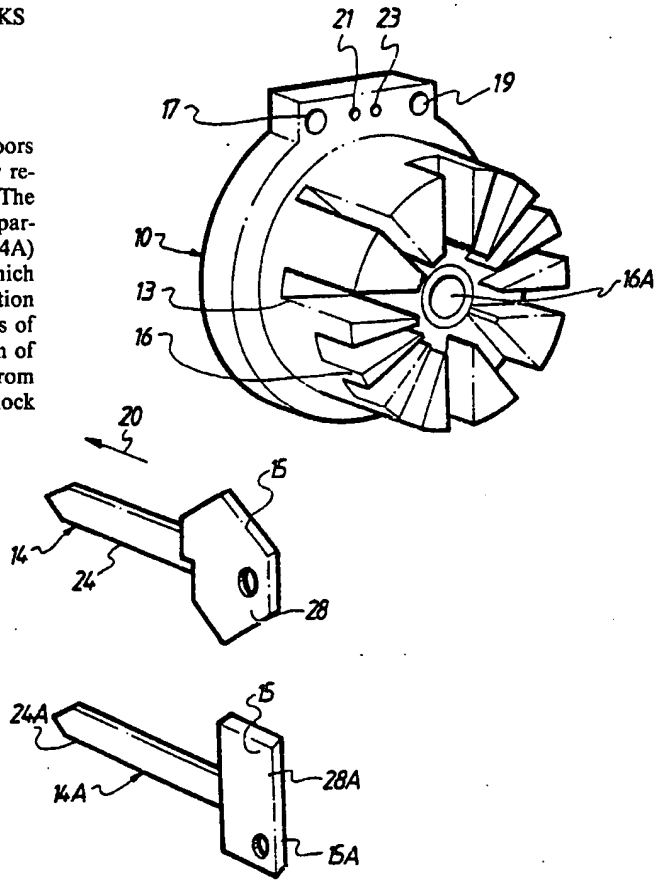
With international search report.

Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: IMPROVEMENTS RELATING TO LOCKS

(57) Abstract

A lock (10) and key (14, 14A) mechanism for doors (12) and the like, whereas the lock electromagnetically recognises a key (14, 14A) when inserted into its bore. The key barrels contain a random distribution of magnetic particles in a non-magnetic aggregate, and each key (14, 14A) is unique. The lock contains an induction coil (29) which outputs a code signal to a memory (22) device on insertion of a key (14, 14A). The memory (12) stores the outputs of newly-inserted keys (14, 14A) to allow future operation of the lock (10), and a key (14, 14A) can be cancelled from the memory (12) to prevent future operation of the lock (10) thereby.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	MR	Mauritania
AU	Australia	GA	Gabon	MW	Malawi
BB	Barbados	GB	United Kingdom	NE	Niger
BE	Belgium	GN	Guinea	NL	Netherlands
BF	Burkina Faso	GR	Greece	NO	Norway
BG	Bulgaria	HU	Hungary	NZ	New Zealand
BJ	Benin	IE	Ireland	PL	Poland
BR	Brazil	IT	Italy	PT	Portugal
BY	Belarus	JP	Japan	RO	Romania
CA	Canada	KP	Democratic People's Republic of Korea	RU	Russian Federation
CF	Central African Republic			SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovak Republic
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	UA	Ukraine
DE	Germany	MG	Madagascar	US	United States of America
DK	Denmark	ML	Mali	UZ	Uzbekistan
ES	Spain	MN	Mongolia	VN	Viet Nam
FI	Finland				

Improvements Relating to Locks

This invention relates to locks, which are usable typically for the control of the opening of doors and other devices. Although the invention can perhaps best be described in relation to the use of the lock in connection with control of the opening of doors, there is no reason why the principles of the invention could not be embodied in other areas of application. However, for the sake of convenience of description and explanation, reference is made hereinafter only to the use of the locks according to the invention in the opening of doors.

There are now various forms of door lock available, the most common of which comprises the use of a metallic key which is cut in order to be coded so as to fit a particular lock mechanism so that only a key fashioned in such manner can be used for opening the lock. Other form of locks comprise electrically and/or magnetically coded devices, or coded punched card, which can be inserted in appropriate locks programmed to recognise the codes and to enable opening of the doors which the locks control.

A lock which can be programmed electronically and keys in the form of cards which can be correspondingly programmed are excellent for use in connection with for example hotel rooms where guests may remain only for an evening or two, because each time a guest leaves, the lock can be reprogrammed and a new card key created for the next guest. The previous guest if he keeps his card key cannot subsequently use same for gaining entry to the room.

Other door locks such as motor car locks can be remotely controlled by means of a coded infra red beam. The key in effect becomes a transmitter of a coded signal which is

recognised by the precoded lock in the motor car, and such devices also have their advantages.

However, all of the known locks are precoded by the manufacturer or by some other party controlling the use of the locks e.g. in the case of a hotel door lock the lock is coded from a central computer station, but heretofore there has been no system providing for more general coding arrangement of the locks.

In accordance with the present invention, in its broadest aspect, a lock mechanism is provided with a memory and that memory is set to be coded for controlling the lock by means of a random code creating device which when brought into the appropriate functional proximity with the lock programmes the memory of the lock such that the said device susequently is usable as a key for operating the lock.

The random coding device may comprise a mechanical device which is capable randomly of creating a code in the lock.

In one particular embodiment, the coding device comprises a mechanical key which is in the form of a shaft of a suitable material, which may for example be a plastics material in which are embedded or in pockets in which are located in a random pattern magnetic particles such as ferrite particles of different grades and/or sizes. The lock would be provided with a receiving device for receiving this shaft, and when the shaft is appropriately inserted into the lock, the magnetic particle distribution is sensed by electro-magnetic coil means thereby creating a code signal which is stored in the memory of the lock. The lock may be provided with an indicating device such as a ligh emitting diode which is illuminated, or perhaps flashes, when the code generated by the insertion of the key shaft is stored in the memory, when

the key can be removed. The code generation preferably comprises the sequential insertion of the key in a number of angular positions which may be the same or different so that the code has a number of bits, increasing the combination of codes which are possible.

Subsequently, the key can be sequentially inserted into the lock in accordance with its code and it will be recognised as matching the coding in the memory, and the lock mechanism will operate, enabling for example the door controlled by the lock to be opened.

Depending upon the programming of the memory i.e. the control of the manner in which the memory operates, the device according to the invention may be such as to enable a number of keys of different security level to be created from the receiver. Thus, if the first key which is inserted in the receiver inserts the first code in the memory, and can be considered as the "super master" key, which would be the highest level of security, the memory may be such, depending upon the sequence of signalling, to create master keys for a second highest level of security. In such a case, after the programming of the lock by the super master key, if the super master key is subsequently inserted, "master" keys may now be produced from the lock, by inserting a fresh key of identical physical construction, but having a different random distribution of the particles. The code signal created by the sequential insertion of this key is loaded into the memory. When the entry of the code has been completed, the master key can be removed. Further master keys can be created from each master, and so on so that as many master keys as there are memory locations for master keys in the memory can be produced. The apparatus may be such that some keys which are produced from master keys are not capable of producing other keys and such keys are lock opening only and

therefore become "utility" keys.

Again, the memory may be such as to be capable of receiving still further key codes for cancellation keys, which can be produced by inserting the master key followed by a cancellation key. The same basic procedure as described above in relation to the manufacture of master keys is followed for the manufacture of cancellation keys except that the track produces an indication that a cancellation key is being made. Each master key may therefore have a cancellation key and the cancellation key code is tied to the code of the master key from which the cancellation key is produced. If the cancellation key is inserted in the lock sequentially the code of the master key is removed from the memory and such master key will no longer open the lock.

It can be seen therefore that for each lock there may be a plurality of master keys and utility keys, and as each has its own unique code, by connecting the lock to a software database, it is easy to analyse the lock utilisation. Any person who opens the lock can be recognised by the appropriate database computer and a record can be made of the time the lock was opened and by which key.

Also, any key, including the super master key, and all keys produced therefrom can be invalidated by its cancellation key. If a master key is invalidated, for example by wiping the code from the memory for that master key, then all other master keys and utility keys produced from that master key are also eliminated. It can be seen therefore that any person who has control of the lock can selectively eliminate particular keys from operating the lock. Furthermore, if the operation of the memory in the lock is controlled by a timing device it can be arranged that some master and utility keys can open the lock at certain times of the day, whilst others

may be controlled so as to operate the lock at other times of the day.

There may be a means whereby the entire memory can be wiped clean in which case all keys including the super master key become invalidated. If these keys have to be used again for controlling the lock, the programming procedure described above must be repeated, but it is to be stressed that any key can be the super master key provided it is brought into the operational proximity with the lock when the lock memory is entirely clear.

The capability of programming the memory to perform in this manner is within the knowledge of the competant electronics programmer.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, wherein:-

Fig. 1 shows a lock device with associated keys according to one embodiment of the present invention;

Fig. 1A is a schematic view showing the ferrite particle distributor;

Fig. 1B, illustrates one form of detection system used in connection with the lock mechanism of the invention;

Fig. 1C illustrates one form of circuit to demonstrate the principle of the embodiments of the invention.

Figs. 2 and 3 are respectively sectional and end elevations of a lock according to a first embodiment of the invention;

Fig. 4 is an end view showing how the door bolt is operated;

Fig. 5 is a perspective exploded view of the door bolt;

Fig. 6 is a sectional view taken on the line VI-VI of Fig. 4;

Fig. 7 is a part sectional elevation of a door lock according to another embodiment of the invention;

Fig. 8 is a sectional elevation of the arrangement as shown in;

Figs. 9 and 10 are a sectional end view and a sectional side view of the drive motor of the lock of Fig. 7;

Fig. 11 is a side view similar to Fig. 10 showing an alternative arrangment of motor drive;

Fig. 12 shows in diagrammatic form a memory bank of the lock mechanism in the embodiments of the invention;

Fig. 13 is a diagrammatic illustration showing how multiple keys of different security levels may be interlinked and produced for use in connection with the locks shown; and

Fig. 14 is an exploded perspective view of an alternative form of key reader device;

Fig. 15 is a perspective view of the device of Fig. 14; and

Figs. 16, 17 and 18 are a plan end view and sectional side view of the device shown in Figs. 14 and 15.

Referring to the drawings, and firstly to Fig. 1, a security lock according to the present invention is illustrated

diagrammatically by reference numeral 10. The lock may be retrofitted to a standard door lock of a door 12 (Fig 2), typically of the type known as the American deadlock. The standard lock is operated through the security lock 10 by means of a key 14 or 14A which is inserted in a receiver barrel 16 of the security lock 10, and after insertion of the key, the barrel 16 is turned slightly as will be described in either direction. Insertion of the key 14 is in the direction of arrow 20.

The security lock 10 contains a register or memory (Fig. 12) for storing codes which control the operation of the lock, and initially the memory which is illustrated diagrammatically in Fig. 12 by reference 22 is blank, but the memory is programmed with codes in accordance with the embodiment of the invention in that the key 14 or 14A comprises a shaft or barrel 24, 24A suitably of a synthetic plastics material and containing randomly distributed magnetic chips or particles such as a ferrite aggregate, the aggregate comprising a cement and any of a number of metal oxides such as for example, zinc, manganese or nickel. Figure 1A is a diagrammatic reprsentation to show the distribution of the ferrite particles (which are of different sizes and/or shapes) throughout the barrel 24 of the keg 14, 14A. The particles instead of being throughout the lengths of the barrel 24 the key 14, 14A, may be grouped in spaced bunches. At one end of the barrel 24 is a finger grip 28, 28A. It will be understood that the keys 14, 14A may be produced inexpensively and in large numbers. They are relatively simple items, but it will be understood that because of the random distribution of the metallic particles in fact no two keys will be identical in their particle distribution. Use is made of this in the instant invention in that the keys 14, 14A are themselves used to programme the memory of the lock 10.

This is explained in more detail with reference to the lock shown in Figs. 2 to 6 and 1B which show that a receiver bore 16A of the lock is surrounded by an induction coil 29 having as shown in Fig. 1B various tappings 30, 32, 34, 36, 38 and 40 which in one arrangement lead to various contactors 42, 44, 46, 48, 50 and 52 which are connected serially by means of contactor switches 54 (which in practice will be solid plate) to a tuned amplifier 56, and the resulting frequency coded output on line 58 provides a coding for addressing the memory 22.

The connections 30 to 40 to the coil 29 are preferably randomly arranged in relation to the coil (but need not be) so that, taken in conjunction with the magnetic particle distribution in the key 14, 14A and its sequence of insertion (to be described) provide different frequency signal outputs on line 58. This resulting unique coding which is entered in the memory is stored within the memory and when the same key 14, 14A is subsequently inserted in the lock to be described, the memory will recognise the key and will permit it to open the lock or the lock to open. The receiver barrel 24 may be of plastics material.

The basic principle of this recognition system is that when the barrel of the key with its ferrite particles is introduced into the coil a specific inductance is produced. The inductance depends upon the type and amount of ferrite in the region of the coil. If the coil carries an alternating current i.e. it is part of a oscillator circuit, the oscillator will generate a particular frequency when there is no key barrel therein, but when the barrel is introduced the inductance of the coil is modified and the frequency of oscillation will change. If this change can be measured as is possible with current technology, then a unique signal can

be created. As the magnetic properties will vary from key to key in much the same manner as finger prints vary from person to person, each key will create a unique change in frequency. It might be noted at this time that frequency of oscillation of the oscillator is effected by temperature, and appropriate corrections may have to be made or temperature variation may have to be taken into account in order to produce reliable and repeatable results, additionally, oscillator drift may have to be taken into account.

As many tappings or separate coils as required may be used depending upon the required security of the system. The change in frequency detected may be on the basis of transient variation i.e. as the key barrel is being introduced, or on permanent variation when the key barrel has been introduced and is held in position for a predetermined time. Appropriate selection must be made for determining the resolution of the detection system to ensure reliable operation, but the basic principle of the illustrated system remains unaltered insofar as when an appropriate key is inserted into the coil, that is to say a key which is recognised by the electronics and allows the door to be opened, the lock will function reliably and allow the door to be opened, but if any other key is inserted, no door opening operation will take place. As will be explained hereinafter, the system is also set so that the first time any particular key barrel is inserted in the coil, the memory is programmed to remember that particular key with regard to its effect on the frequency of the oscillator and to programme the memory so that subsequent insertion of that key will operate the lock.

Figure 1C shows one arrangment which may be adopted for analysing the effect of inserting a key barrel 24 into a coil 29. The coil has a spectrum analyser connected thereto by

the components shown and if one examines a trace from the spectrum analyser, it will be seen that with no key inserted the coil which is connected to an oscillator has a resonant frequency. As the key is slowly inserted, the resonant frequency decreased rapidly to a low and then increased gradually to a settled figure less than the resonant frequency. The resonant frequency was restored when the key was withdrawn. Other keys inserted in this way displayed the same effect but different overall characteristic frequencies.

Frequency measurement can be by any suitable electronic method such as indirect frequency measurement, inductor coupling and frequency modulation and any suitable circuitry may be arranged for producing the output on line 58 to be fed to the memory 22.

Instead of detecting frequency change, the electronics may be set to measure the phase shift in the signal which takes place between situation wherein the key barrel is not inserted in the coils, and when it is slowly inserted. As the barrel is inserted there is in addition to frequency change a phase change in the output signal, and this phase change produces a phase difference finger print along the distance of the key which uniquely identifies the key. Use can be made of this signal in order to programme the memory.

As to the arrangement for the programming of the memory reference is now made to the Figs. 12 and 13.

As mentioned above, the frequency output from the tuned amplifier 56 is proportional to the signal generated by frequency variation, and each frequency output is transferred into digital outputs typically in the range 0 - 15. When the key is placed into the receiver 16 for the first time, the

ferrite chips along the length of the key induce the current to flow within the inductance coil. The random distribution of chips results in different current flows within each segment. The contact switch 54 samples the segments in turn, and the respective frequency outputs from the segments form the respective bits from the least significant to the most significant of the code identifying the key. With this arrangement, when using hexadecimal coding, a large number of codes are available for use. One can increase the number of coil segments to increase the number of bits in the code whereby the number of available codes can be increased drammatically. The range of codes available for one segment is 0 - 15, but the range of codes available for six segments is in the order of 17 million.

The number of levels of security which can be recognised by the lock depends upon the preprogramming of the operation of the memory. For example, the memory may be set to receive only the coding of a single key, in which case as soon as the first key is inserted in the receiver when the memory is blank, that code is entered in the memory and the lock recognises that key and that key only for susequent operation of the lock. In such case the memory may be wiped clean for example by a switch or button located inside the lock 10. Such an arrangement would have limited use however, and the electronics are preferably programmed so that each lock can be operated by any of a large number of keys but of differing levels of security. It is proposed that the electronics be preprogrammed to store the code of a first entered key and to make that key a "super master" key. There may also be a facility for forming a cancellation key for the super master key. When the first key is inserted to set the code of the super master key, a switch button 17 (Fig.1) is pressed and the key is inserted as described hereinafter. As the completion of the coding a button 19 is pressed.

If it is desired to make a cancellation key or a master key from the super master key, upon completion of the entry in the memory of the master key code, button 19 is not pressed, but the super master key is removed, and the next key to be created is inserted. If a cancellation key is to be created, button 19 is pressed, and upon completion of the coding, button 17 is pressed. By pressing the buttons 19 and 17 in that order, the memory recognizes the key as a cancellation key.

If a master key is to be created from the super master key, following insertion of the key to form the master key button 17 is pressed, and at the completion of the coding, button 19 is pressed. The pressing of the buttons 17 and 19 in that order means the creation of a key which can be used for opening a lock. Such a master key can be of a type able to reproduce further master keys, or it can be of a type which is not capable of producing further master keys. In the latter case, at the completion of the coding for the master key the button 19 is pressed twice, which means that that master key cannot subsequently be used for making other master keys.

A cancellation key for any master key is produced similarly to the method described above except that the master key is first inserted in the lock and button 17 is pressed. The master key is coded and at the completion of that coding, button 19 is not pressed. The further master key to be produced is then inserted and button 17 is pressed. The key is coded and at the completion, button 19 is pressed for storing that code in the memory.

All keys created via the lock in this way which can open the door or arrange for opening the door simply by inserting the

key as described hereinafter.

It should be mentioned that although in the preferred case each code for each key will involve insertion, removal and turning of the key before reinsertion, it is possible for any key to have a code produced by inserting the key a number of times to form part of or all of the code.

Fig. 13 is a diagrammatic indication indicating how a plurality of keys can be used for the lock. The super master key is indicated by reference 14, and its invalidation key by 14Z. In the diagram of the memory 22 in Fig. 12, the code for the super master key is indicated by a rectangle 14X, whilst the code for the invalidation key is indicated by reference 14AX.

It is likely to be the case that lower levels of security keys are required, and from each super master key 14 there may be created master keys 68 and invalidation keys 68A as described. Each master 68 and each invalidation key 68A will have its own unique code 68X, 68AX stored in the memory, and typically the master key codes may be stored in regions indicated diagrammatically by reference 68X in Fig.12. Boxes 68AX indicate the locations of the invalidation key codes for the master keys 68.

As also shown in Fig. 13, utility keys 70 (keys which can only open the lock) and corresponding invalidation keys 70A may be produced from each master 68 as described herein. The utility key codes are indicated as appearing at regions 70X in Fig.12 whilst the invalidation keys for the utility keys are indicated by regions 70.

In considering Figs.12 and 13 therefore it can be seen that for each super master key 14 a plurality of master keys 68

can be produced, and from each master key, a plurality of utility keys 70 can be produced. Each of these keys is electrically unique by virtue of the distribution of the magnetic particles, but is physically the same as each other key. Any one of the keys therefore could be the super master dependent entirely upon the order in which the keys are inserted in the lock 10 when its memory is clear. The sequential insertion of any invalidation key wipes clean the code box in the memory 22 of the corresponding key from which it was made and all keys made from that key. Therefore if the super master invalidation key 14 is inserted in the lock to invalidate the key code 14, all keys are invalidated. Equally, if one of the invalidation keys 68A is inserted to invalidate a corresponding master key 68, then all master and utility keys 70 made from that master key are invalidated. If a single invalidation key for a utility key is inserted, then only that utility key is invalidated.

It can be seen that extensive and accurate controls can be effected on the utilisation of the keys. Especially if, as is possible, the electronics in the lock 10 can be controlled on a time basis. This control can be used to monitor the utilisation of the respective keys in the lock, and this monitoring can be analysed in such detail that every time the lock is operated, a record can be kept indicating when the lock was operated and by which key. This can be extra useful for security purposes.

Referring now in more detail to Figs. 1 to 6, for more specific details of the lock, the barrel 16 as shown in Fig. 1 is provided with a plurality, preferably twelve radial slots 13, and the key 14, 14A is provided with a key fob 15, 15A adapted to be received in the slots 13. Slots 13 are of different length so that as the key is inserted in any one of the slots, it will be inserted to a lesser extent or a

greater extent than it would be in another of the slots and so on. If these slots are for example numbered 1 to 12, a key code can be generated by inserting the key in respective slots 13 in a desired code sequence. At each insertion of each slot, the lock is operated as described in order to programme the lock, and control the operation of same.

Additionally, the lock 10 has the operating buttons 17 and 19 which must be operated when programming the lock as described, and has indicator lights 21 and 23 which are for a purpose to be described.

The sequence of operation of programming the memory and making the keys involves inserting the keys 14, 14A in the desired sequence in the slots 13, and when the key is inserted in each slot, it is necessary to turn the key slightly to cause slight turning of the barrel 16 in either direction, to cause operation of a piezo electric switch 25 shown in Figs. 2 and 3. In the case of the arrangement of Fig. 2, the barrel 16 has an extension shaft 16B which extends through the door 12 and in the other end of same is mounted a door handle 27. The shaft 16B is prevented from turning by means of a rack and pinion arrangement 33 and an electrically operated locking arrangement with which the piezo electric switch 25 is associated. When the key is inserted, whether for coding or for opening the door, it is inserted in the appropriate slots in the barrel 16 in sequence, and at each insertion, the barrel is turned slightly until the piezo electric switch operates whereby a code is inserted in the memory, or the code is recognised. In the case of code recognition, the electrically operated latch is released and then the barrel 16 is turned to rotate the drive pinion 35 (Fig. 4) which engages rack teeth 37 on the door bolt 39 and the bolt is retracted from the door keeper plate 41 and the door can be opened.

As will be understood from Figs. 4, 5 and 6, the barrel 16 is located in the door 12 above the door bolt 39. The bolt 39 as shown in Fig. 5 is hollow and inside the hollow is provided an electric motor 10X which has on its output shaft a bevelled pinion 12X. This pinion 12X is shown most clearly in Fig. 6 engages a bevelled gear 14X on a screw shaft 16X. The screw shaft 16X lies horizontally in use, and it is oppositely threaded at its respective ends and carries latch bushes 18X, 20X thereon.

The electronics for the control of the motor are also housed inside the bolt 39 and are indicated by reference 22X, the motor having integral connections thereto. An input aperture 24X permits the electrical connections to be made between the piezo electric switch of the lock barrel and the electronics 22X.

The latching bushes 18X and 20X are normally received in apertures 26X in the bolt 39 and projects through corresponding apertures 28X in a housing 30X which fits into the bolt in complimentary fashion, said apertures 28 registering with the apertures 26X.

When a signal is received from the barrel by the correct insert of the key, the motor is driven in order to rotate the shaft 16X which causes the latching bushes 18X and 20X simultaneously to retract into the recesses 28X in the housing 30X. This now enables the lock bolt to be retracted from the keeper plate 41 and the door to be opened. The retracted position of the bushes 18X is indicated in dotted lines, and dotted lines also indicate the retracted position of the door bolt 39.

Figs 7 to 10 show another mechanical arrangement for the

lock, and referring to these figures, in Fig. 7, a similar barrel 16 is used in the door 12.

A slightly different door bolt arrangement is adopted however, and the door bolt is shown at 50 and it will be seen to be biased to a closed position by means of door spring 51 which is a leaf spring suitably loaded.

A door shaft 52 passes through the housing 53 which houses the bolt 50, and the shaft 52 supports a cam 54 which engages in a cut-out 56 in the bolt so that by turning of the door shaft 52, the cam 54 engages a rear plate 57 of the bolt and can move same to a door opened position. Movement of the bolt 50 to the door open position, in the direction of arrow 57 is in fact prevented by a door stop (58) which is adapted to be moved under the control of an electric motor as indicated by arrow 59 in Fig. 7 so as to abstruct the movement of the bolt 50 or to allow it to take place. The motor is controlled in much the same manner as the motor described in relation to Fig. 6 by means of the insertion of the key into the barrel 16.

The motor is indicated by reference numeral 60, and reference is best made to Figures 9 and 10 to indicate the manner of operation of the motor to move the bracket 58.

Referring to these figures, it will be seen that the motor 60 is contained in a housing 80 and its drive shaft again supports the drive pinion 82 which is a bevel pinion and engages a bevel wheel 84 on an adjustment shaft 86. The adjustment shaft 86 is threaded at 87 and the threads engage the interior a sleeve 88 fast with the bevel wheel 84.

The spigot ends 88 and 89 of the shaft 86 engage in recesses in the bracket 58, and the arrangement is that when the motor

60 is driven from the appropriate signal from the insertion of the key, the shaft 86 rotates by being driven via the bevel gears 82 and 84 and the bracket is moved up or down depending upon the instruction given as between the dotted line positions 90 and 91 shown in Fig. 10. The operation will be clearly understood insofar as when a key is inserted in the barrel 60 and if it is the correct key such as to cause operation of the lock to allow the door to be opened, the signals derived instruct the motor to rotate to move the bracket 58 downwardly in Fig. 7 thereby clearing the bolt for movement in the rearwards direction to enable the door to be opened.

In Fig. 8, there is also shown the piezo electric switch 25 and the coil 29 which function in the manner already described.

The battery for driving the motor is shown in Fig. 8 at reference 91, but alternative battery position is shown at 92 in Fig. 7. In Fig.8 the battery is shown as being housed in the door, whilst in Fig. 7 the battery is shown as being housed in the housing 53.

The arrangement shown in Fig. 11 is a modified form of drive insofar as the motor 60 is provided with a worm shaft 93 on its output shaft, and the worm shaft engages a worm wheel 94 which is connected to the bracket 58 so as to move same in exactly the same manner as described in relation to Figs. 9 and 10.

Other structural arrangements can of course be adopted for the mounting of the mechanical parts of the lock.

It will be appreciated that appropriate electrical connections must be provided between the respective parts of

the lock system and in relation to some embodiments it is of advantage to have the electronics wrapped around the motor and encased in a housing for security reasons.

Where an electric motor has to react to release a latch mechanism when the correct operational key is first inserted in the lock, it will be arranged that the motor can respond quickly enough in those cases where the latch is moved out of the way and then the door handle is turned manually to displace the lock from the keeper plate. Additionally, any attempt to deactivate the motor to gain access through the door for example by drilling into the door and into the motor would result in damage to the wrap round electronics which would render the motor unusable and would retain the locking bolt in a locked position.

A significant feature about the lock systems according to the embodimentsof the invention is that simple inexpensive keys can be used for operating the lock and also that the lock memory is programmed by the use of these keys preferably based upon the concept that the positioning of the key shaft 24, 24A in the coil 29 creates a unique signal.

The extent of application of the present invention is enormous in that an infinite number of locks can be created, and they can be controlled using keys which can be readily mass produced and are of identical physical shape but differ simply in the random pattern of magnetic particles. Each single lock can accept thousands of individual keys or only one key depending upon the requirements of the user.

The level of security of utilisation of each key 14, is enhanced in that the key requires a sequence of entry to create the code or to invalidate the code. Thus, in the arrangement shown in Figs. 1 to 5 each key 14 is sequentially

inserted at different (or the same) angular positions and therefore has a sequence of insertion, and that sequence extends the code range. This would make it virtually impossible for a person finding a key to operate a lock unless he knew the sequence of insertion or code. Each and any has its own operating sequence. Indeed the key may be also associated with a second operating sequence which is followed would set off a silent alarm should for example a valid key holder be forced to open the lock under duress. The invention can be used for any level of security required of a lock e.g. for a garden shed or for a bank vault.

Essentially, in the invention the lock and key system is such that both the lock and key have virtually unique non-repeatable random charcteristics and the lock electronics validate the keys. The arrangement wherein randomly coiled induction coils, and with random capacitors provide random resonant frequencies is only one method of providing the random characteristics. Thus the use of the appropriately shaped key which contains ferrite or similar particles which randomly modify the resonant frequencies of the coils is only one manifestation of the invention. The system could be set up such that the lock is operated by electro-magnetic signals, infra red signals, illumination signals and the like as long as the lock random characteristics are appropriately randomly modified by the key device.

When the key involves a personal operation sequence, this sequence should be followed at the time of entering the code into the computer memory to validate the key.

The electronic controls of the lock may be such that if an invalid key is used in an attempt to operate the lock, this could be signalled, and preferably there will be an inbuilt delay of two minutes before another attempt can be made to

open the lock. If a key is lost or stolen it can be invalidated using the invalidation key.

In the embodiment described, as the key is a completely random arrangement of particles embodied in a matrix, and the particles are of indestructable mineral, it is very difficult if not impossible to duplicate a key.

It may be desirable to provide a means whereby the lock can be opened from the inside and the entire memory reset should for some reason the super master invalidation key become lost or should it be broken or otherwise fail to function.

The system provides the considerable advantage that it is not necessary to change locks under any circumstances even if all of the keys are lost or destroyed. The lock can easily be cleared and a new set of keys revalidated upon change of ownership of the lock.

The lock units of the system can be retrofitted to existing locks, and they can also be embodied in completely new locks.

Referring now to Figs. 14 to 18 which have been added to show yet a further embodiment of a key reader device for use in connection with the invention it is to be mentioned that all of the features referred to hereinbefore where appropriate can be applied individually or in combination to this arrangement as appropriate.

Referring to Figs. 14 and 15, and in particular Fig. 14, the reader device which for example fits in a door comprises a pair of shells 10Z and 12Z which are adapted to fit together to form a unit 14Z as shown in Fig. 15.

The shells together define a pair of parallel cavities 16Z

and 18Z which are for receiving two slide blocks 20Z and 22Z. These slide blocks contain the coils of the type as hereinbefore referred to detect the key and for programming and so on, and the inner faces of the blocks have rack teeth 24Z and 26Z which are adapted to engage opposite sides of a drive pinion 28Z which in use is positioned therebetween and in engagement therewith.

The pinion 28Z is received in finger control disc 30Z so as to ally with its axis vertical and to be rotatable so that the slide blocks 20Z and 22Z can be moved back and forth as indicated by arrow 32Z.

Each of the blocks 20Z and 22Z houses a pair of the said coils as indicated at 34Z and 36Z, and there is a bore 38Z in each block which receives a plastic sleeve 40Z for protection purposes.

When the unit is assembled as shown in Fig. 15, it has a front slot 42Z for receiving the key (of the characteristics hereinbefore described) which is indicated by reference 44Z. This key has two key shafts 46Z and 48Z which are adapted to be received in the bores 38Z of the two blocks. The key shafts 46Z and 48Z have the ferritic particles for effecting the induced field in the coils for the purposes of electronic reading as hereinbefore described.

The disc 30 is provided with a series of digit indications 50Z on its periphery so that the disc position can be indicated. It would be appreciated that by turning the disc so the blocks 20Z and 22Z will be displaced back and forth and will lie at different longitudinal positions to receive the key shafts 46Z and 48Z.

As a significant feature to be mentioned at this point is

that the randomness of the key and the detection system is effected by the extent to which the key shaft penetrates the coil or coils, and by controlling the depth of penetration as already hereinbefore described much greater sensitivity and variation can be achieved. In the coding arrangement therefore the disc may be adjusted to any angular position or series of positions followed by the sequential insertion of the key, or alternative the key may be left in position whilst the disc is varied for providing the code reading.

When the reader reads a correct key, then the lock will function or other appropriate operation will be carried out.

The making of the key furthermore to have two shafts 46 and 48 again improves the resolution and accuracy of the system, and it is better to have the coils in spaced separate arrangements for this purpose.

Relative coil and key displacement therefore is of importance.

The electronics may be set up in order to provide recoding each time a correct key is inserted, in order to compensate for drift.

In accordance with another desired feature, the keys may be of slightly different lengths in order to increase the randomness of same.

By providing a multiplicity of coils in alignment and in spaced arrangement, high accuracy of detection and resolution can be achieved.

The use of multiple shaft keys furthermore improves resolution, and it should be mentioned that although ferrite

particles have been specifically referred to herein, the key materials may be different while still producing a readable effect.

For example, it is possible to use a key with a shaft containing random glass particles which have different reflective and refractive effects on an illumination source directed at the particles. Equally, the key could be in different spectral colours created in a random basis so that different spectral effects could be achieved by using a light source reader.

CLAIMS

1. A lock mechansim including a memory wherein said memory can be set to control the activation of the lock by means of a code creating device which, when brought into functional proximity with the lock sets the memory such that the code creating device or a device with substantially similar configuration is subsequently usable as a key for operating the lock.

2. A lock mechanism as in claim 1 wherein the memory of the lock is electronically controlled and is set by the detection of an electrical signal code generated by the code creating device.

3. A lock mechanism as in claim 2 wherein the memory is electrically connected to at least one wire coil into which the code creating device is brought into functional proximity by insertion causing an electrical inductance signal code to be created and detected.

4. An electrical inductance signal code as in claim 3 wherein said code is detected by any of direct frequency measurement, indirect frequency measurement, inductor coupling, frequency modulation or phase measurement.

5. A lock mechanism as in claim 2 wherein the said electrical signal code is increased by the sequential insertion of the code creating device into the lock mechanism in a number of angular positions.

6. A lock mechanism as in claim 5 wherein said code creating device is sequentially inserted in a plurality of random positions which includes at least one repetition of a previous position.

7. A lock mechansim as in any of the preceding claims wherein said lock is usable with a code creating device said device in the form of a mechanical key including at least one area therein which is formed of magnetic particles.

8. A code creating device as in claim 7 wherein said magnetic particles are placed in a known configuration to provide a magnetic characteristic of that device and hence define a distinguishable code signal for the memory when placed in proximity to the lock memory.

9. A code creating device as in claims 7 or 8 wherein the magnetic particles are ferrite particles provided in an aggregate formed with a cement.

10. A code creating device as in claim 7 wherein said device comprises a shafthand a handle said shaft incorporating at least one area of magnetic particles.

11. A device as in claim 10 wherein the handle is shaped to allow the device to be insertable into the lock mechanism in a limited number of angular positions.

12. A lock mechanism comprising a memory which is set to be actuable upon the insertion of a code creating device of matching configuration, said device including at least one area of magnetic particles and wherein said lock mechanism is lockable or releasable upon the memory therein receiving a code signal from the code creating device which is substantially similar to that held within the memory.

13. A lock mechanism as in claim 12 wherein the code signal held in the memory is generated by the configuration of the magnetic particles on the code creating device and by the

sequential insertion of the device into the lock in a number of angular positions.

14. A lock mechanism as in any of the preceding claims wherein the lock further comprises a locking bolt mechanism which is movable between a locked position and an unlocked or retracted position and wherein said mechanism includes at least one bolt retaining screw.

15. A lock mechanism as in claim 14 wherein said bolt retaining screw is movable between a first position such that the locking bolt is movable and a second position wherein the locking bolt is maintained in a locked position.

16. A lock mechanism as in claim 15 wherein said screw is driven by means of a motor provided within the lock mechanism.

17. A lock mechanism wherein said lock includes a memory which is set by the insertion of a code creating device and said lock is operable by the insertion of the code creating device or a device with substantially similar configuration in the correct sequence to substantially reproduce the code signal held in the memory and wherein upon a matching signal code being detected to operate the lock, the memory is revised to memorise the newly input signal code.

18. A lock mechanism as in claim 17 wherein the signal code held in the memory at any one time is the last matching signal code entered into the lock.

19. A lock mechanism as in any of the preceding claims wherein the signal code set in the lock memory to allow actuation of the lock can be cancelled by the transmission to the memory of a cancellation code.

20. A lock mechanism as in claim 19 wherein the cancellation code is transmitted to the lock memory by the insertion of a code creating device with a magnetic particle configuration which serves to cancel the existing memory.

21. A lock mechanism as in claim 19 wherein said loc kcan be placed into a cancellation mode from a remote point such that the signal code held in the memory is cancelled and insertion of a new code creating device will set the memory with a new signal code.

22. A lock mechanism including a memory wherein said memory can be set to control the activation of the lock by means of a signal code generated by a code creating device wherein said memory is capable of storing a plurality of signal codes therein.

23. A lock mechanism as in claim 22 wherein said lock is activated upon the insertion in the correct sequence of a code creating device top create any one of the code signals held in the memory.

24. A lock mechanism as hereinbefore described with reference to the accompanying drawings.

25. A method of setting a lock mechanism including an electronic memory therein wherein said method comprises the sequential insertion of a code creating device, said device including at least one area of magnetic particles, into the lock mechanism in at least one angular position to create an electrical signal code, said code detected by the mechanism and retained in the memory.

26.A method as in claim 25 wherein said code creating device is inserted into the lock mechanism in a plurality of angular

positions to create a signal code determined by the configuration of the device and the sequence of insertion of the device.

27. A method of operating a lock mechanism wherein said code creating device or a device with substantially similar magnetic particle configuration is inserted into the lock mechanism in the designated sequential angular positions to provide a substantially matching signal code to that held in the memory and hence cause a locking bolt associated with the mechanism to be operable between a locked and unlocked position.

28. A method of operating a lock mechanism as hereinbefore described with reference to the accompanying drawings and description.

29. A key for setting and/or operating a lock mechanism which is responsive to magnetic influenced, said key comprising a member comprising ferrite particles.

30. A key according to claim 27, wherein the key comprises a key shaft and said particles are contained in said shaft.

31. A key according to claim 30, wherein said shaft is of plastics material and said particles are embedded therein.

32. A key for said and/or operating a lock mechanism which is responsive to radiation detection, said key comprising a number of inherent random characteristics which are detectable by a detection mechanism.

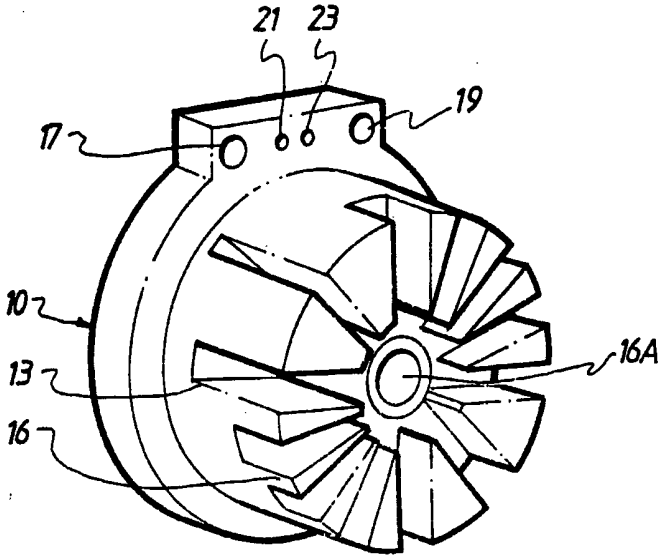
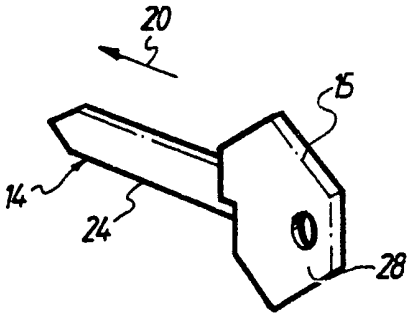
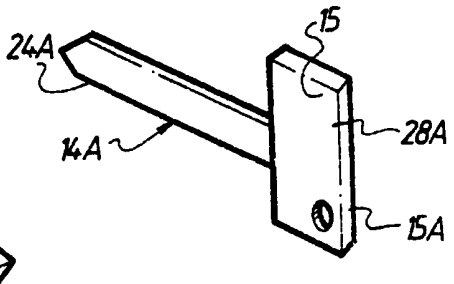


FIG.1.





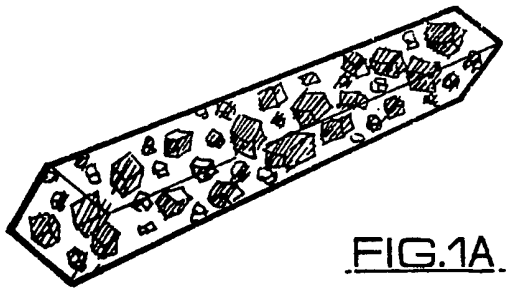


FIG.1A.

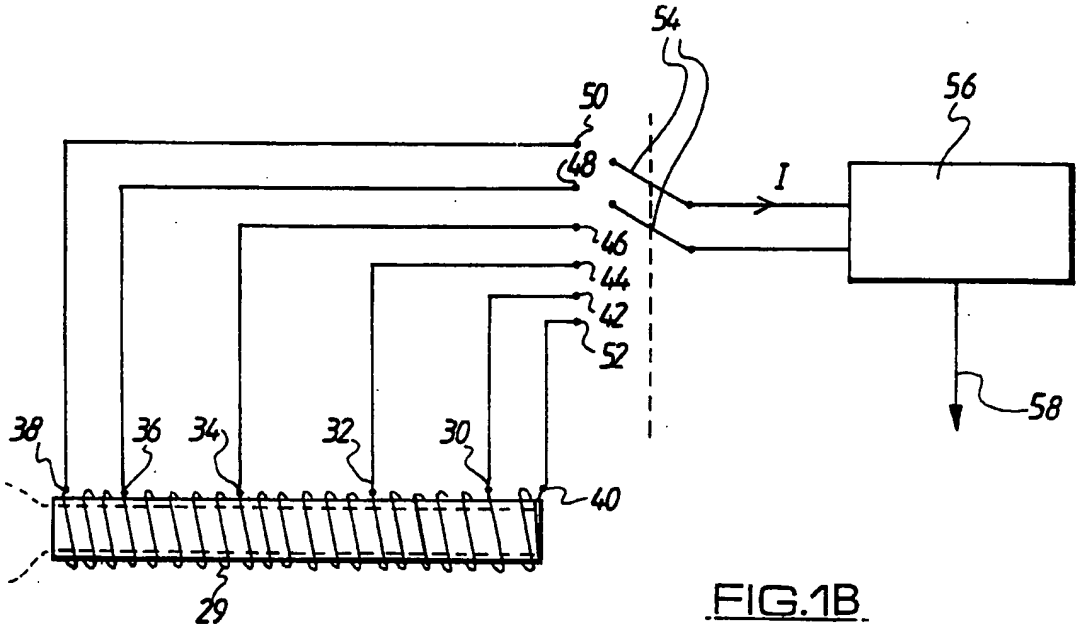


FIG.1B

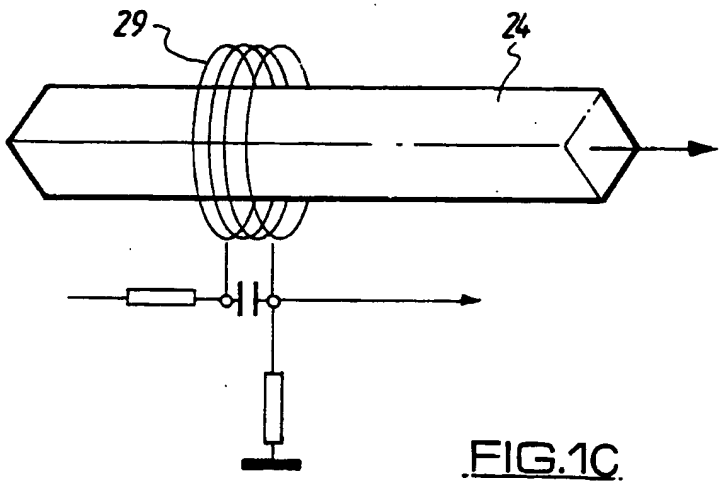


FIG.1C

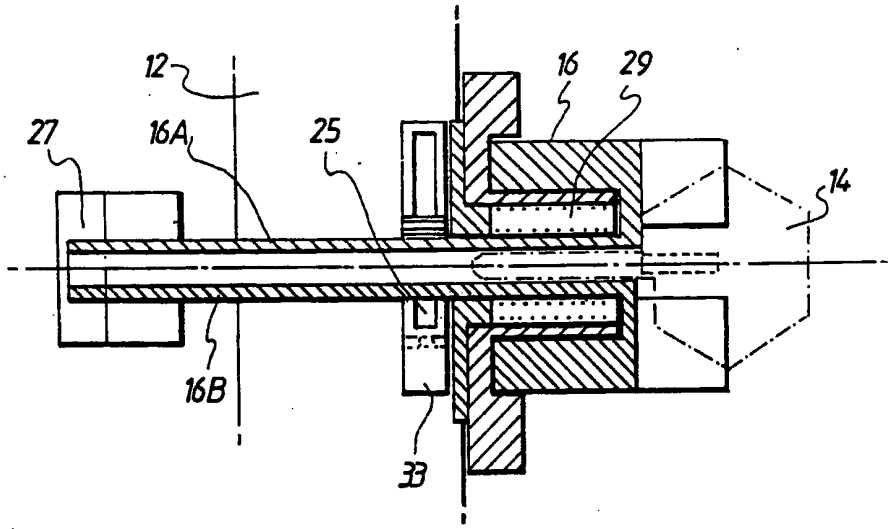


FIG.2

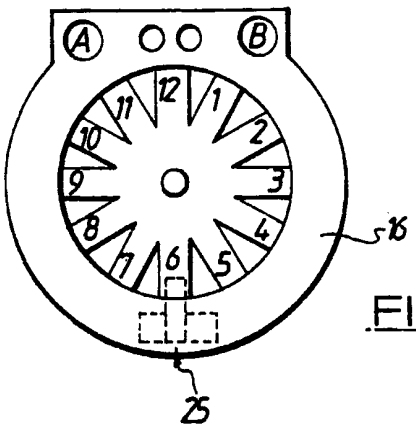


FIG.3

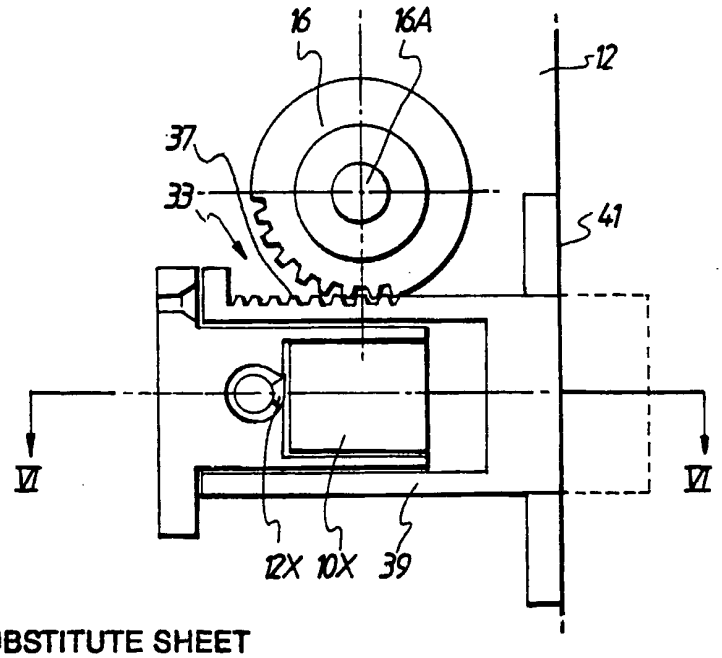


FIG.4

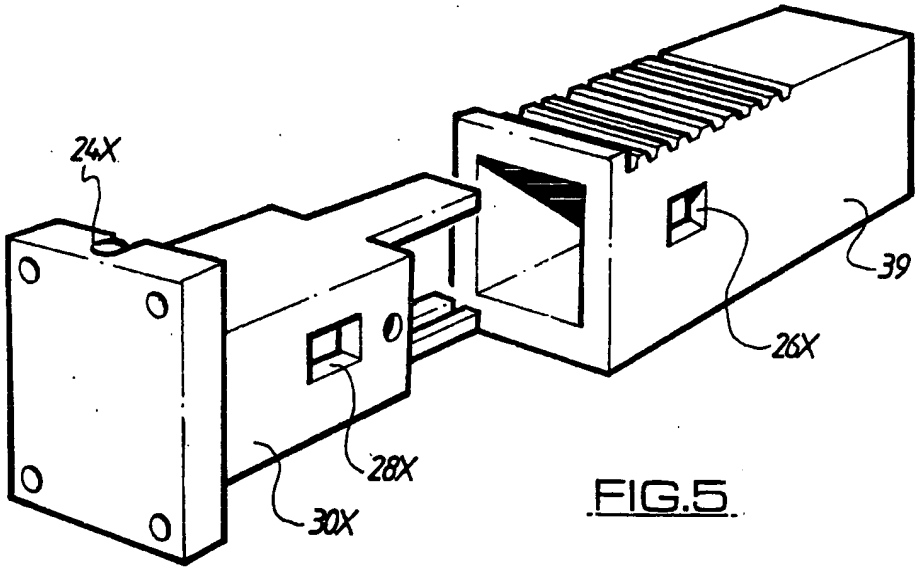


FIG.5

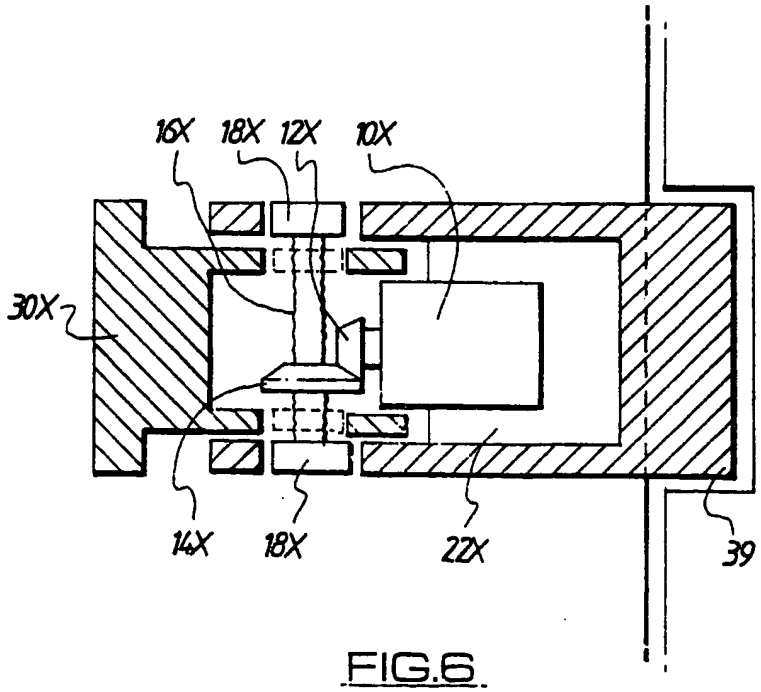


FIG.6

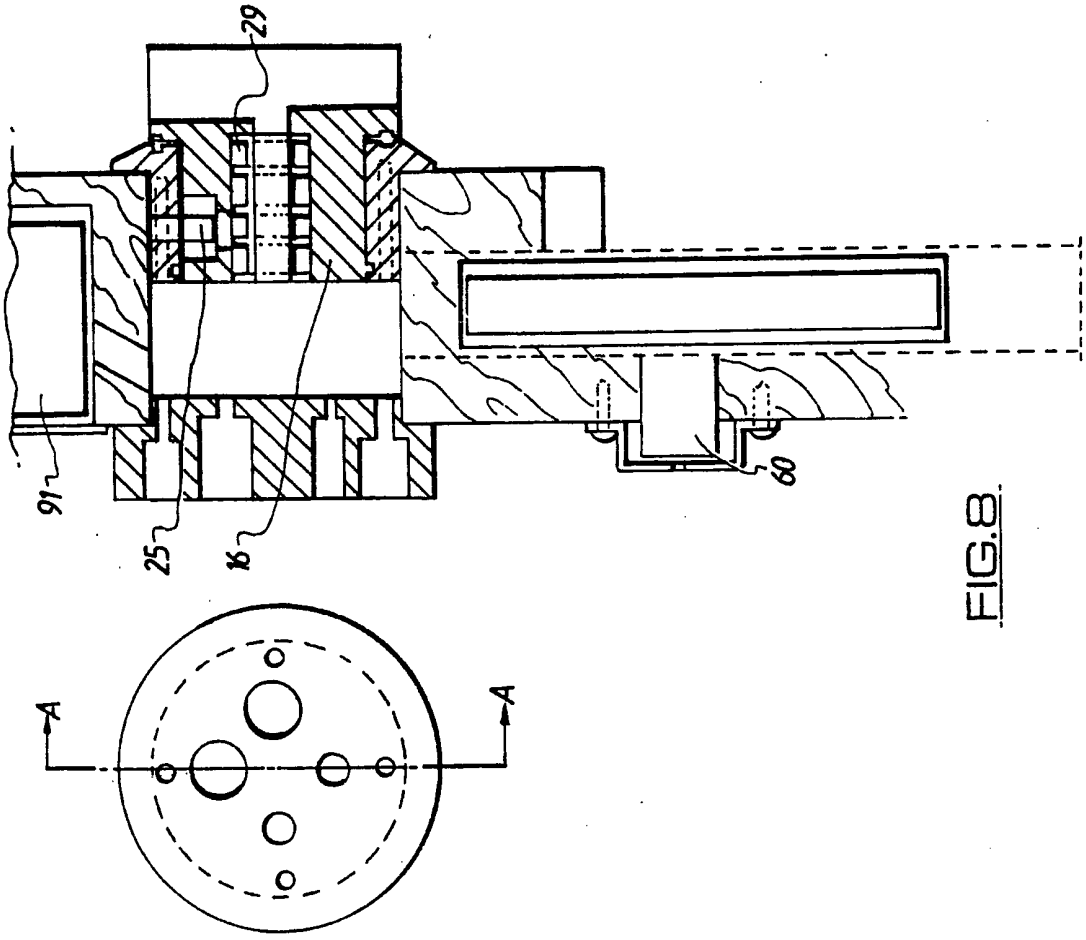

29
91
25
16
60
A
A

FIG.8

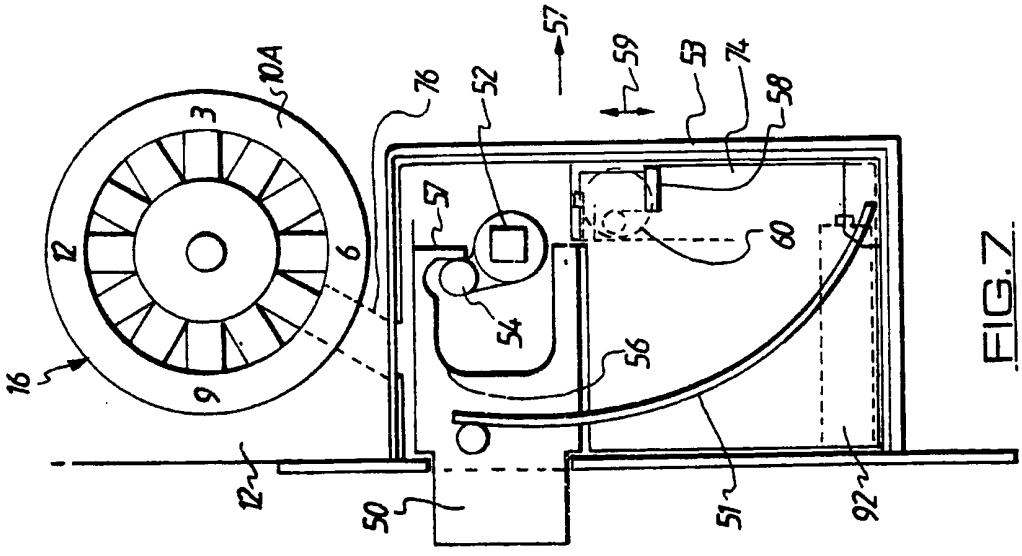

57
59
53
74
58
10A
76
52
3
12
6
9
16
57
54
56
60
12
50
51
92

FIG.7

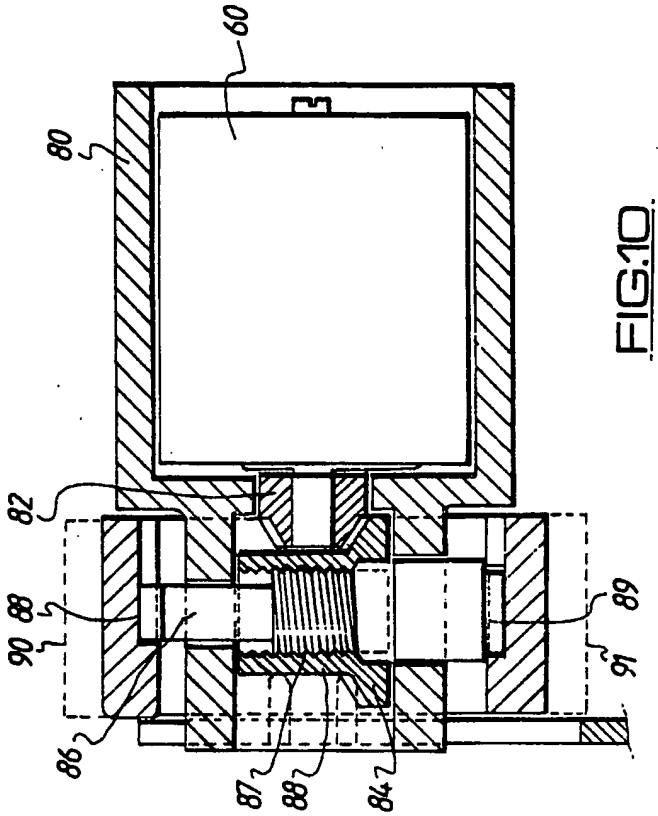


FIG.10.

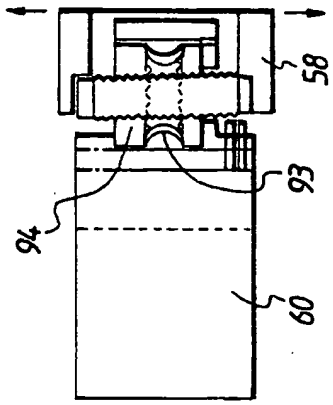


FIG.11.

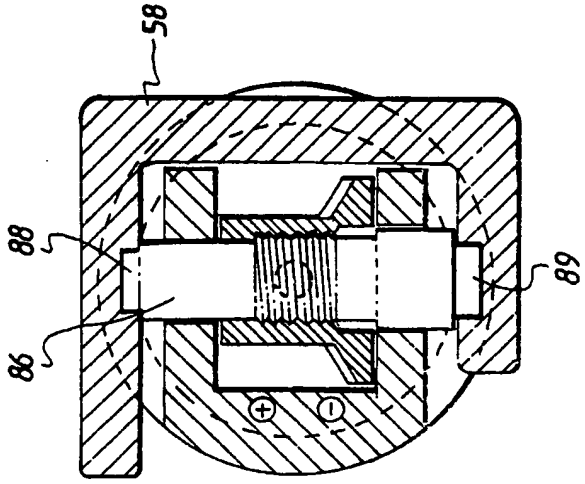


FIG.9.

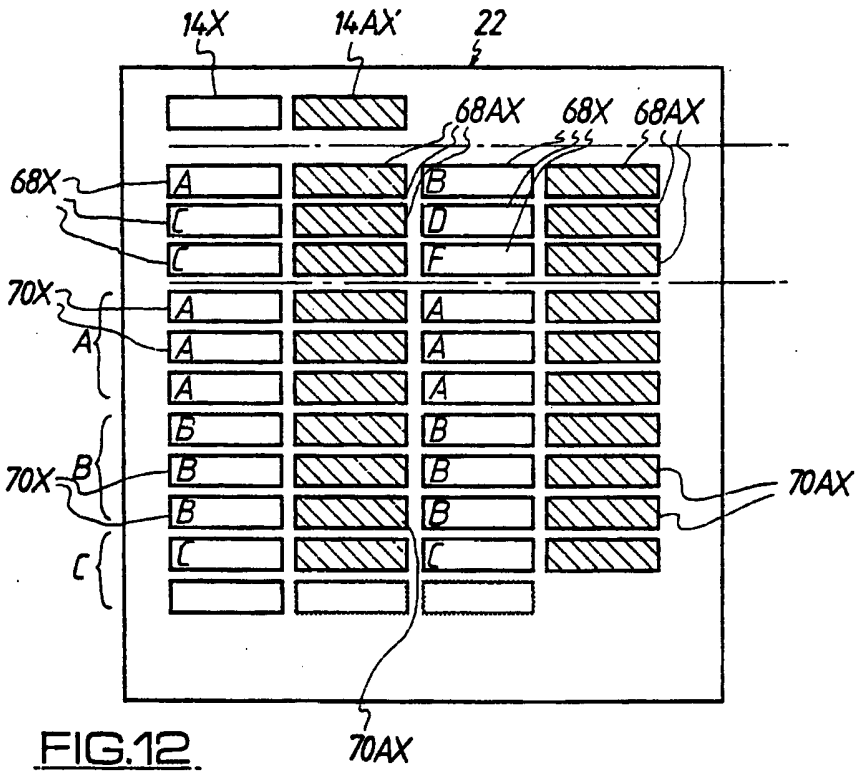

14X
14AX
22
68AX
68X
68AX
68X
70X
A
70X
B
70X
C
70AX
70AX

FIG.12

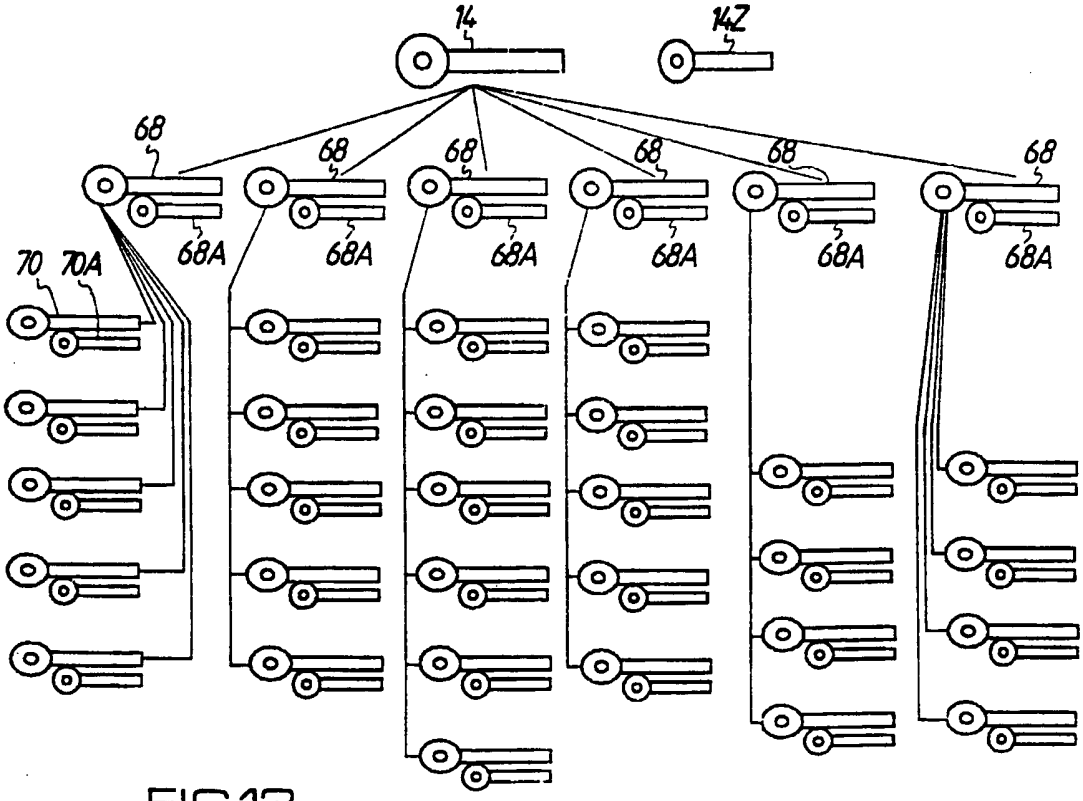

14
14Z
68
68A
70
70A

FIG.13

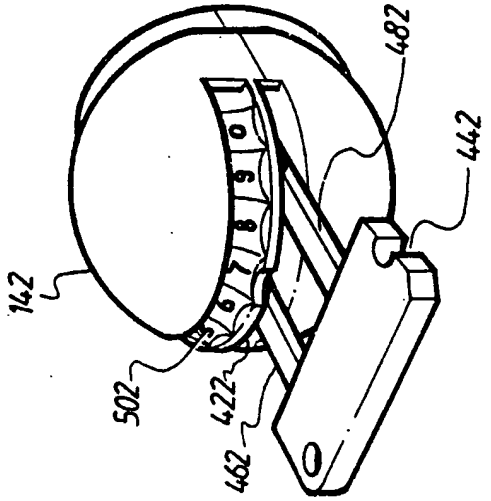

482
442
142
502
422
462

FIG.15

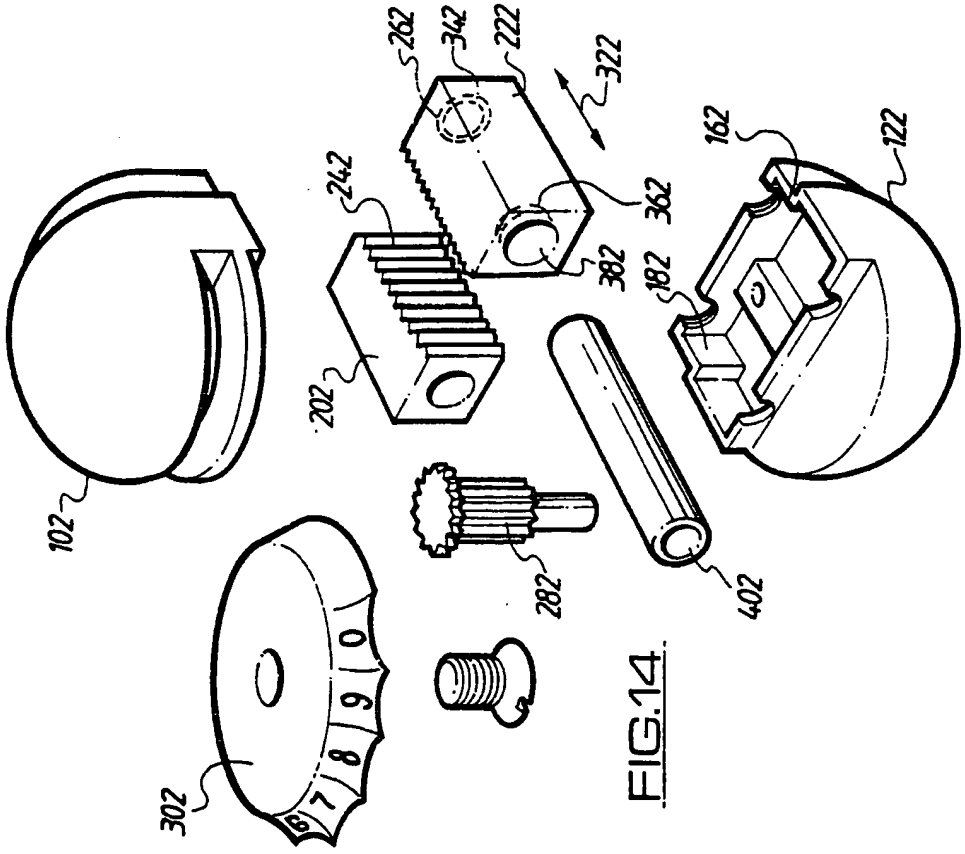

262
342
222
322
242
362
162
122
382
182
202
102
282
402
302

FIG.14

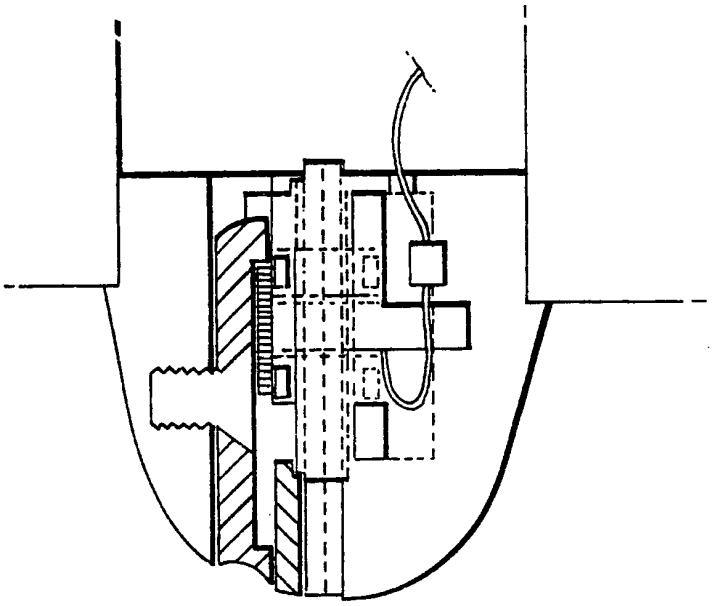


FIG.18

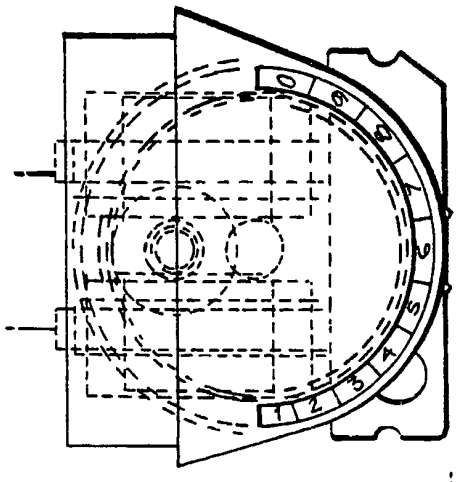


FIG.16

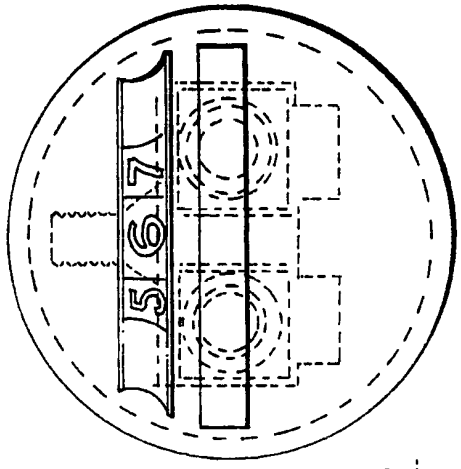


FIG.17

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 93/01410

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: E 05 B 47/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	E 05 B

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	DE, A1, 3 122 064 (GOMEZ-OLEE NAVEDA) 18 March 1982 (18.03.82), claims 1-19; fig. 1-10; page 30, lines 5-11; page 31.	1,4,5, 7,8, 10-12, 14,15, 24,28, 29,32
X	AT, B, 361 798 (BAUER KABA AG) 25 March 1980 (25.03.80), claims 1-8; fig. 1-6; page 5, line 43 - page 7, line 41.	1-5,7, 8,11, 13,14, 17,22, 23-28, 30,31
A	FR, A1, 2 561 703 (GENUS INTERNATIONAL) 27 September 1985 (27.09.85), claims 1-6; fig. 1-3.	1
A	FR, A1, 2 669 368 (VACHETTE) 22 May 1992 (22.05.92),	1

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
03 November 1993	22. 11. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	CZASTKA e.h.

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ** with indication, where appropriate, of the relevant passages	Relevant to Claim No.
	claims 1-17; fig. 1-9.	
A	DE, A1, 3 244 566 (ANGEWANDTE DIGITAL ELEKTRONIK GMBH) 22 May 1992 (22.05.92), claims 1-3; fig. 1-4.	1
A	FR, A, 2 441 036 (SACHS SYSTEMTECHNIK GMBH) 06 June 1980 (06.06.80), fig. 1-3.	1
A	DE, A1, 2 752 106 (BSG SCHALTTECHNIK & CO KG) 23 May 1979 (23.05.79), claims 1-2; fig. 1-3.	1
A	FR, A, 2 356 790 (YMOS-METALLWERKE WOLF & BECKER GMBH & CO) 27 January 1978 (27.01.78), fig. 1-3; claims 1-8.	30,31, 32
A	DE, A1, 3 514 149 (SACHS SYSTEMTECHNIK GMBH) 30 October 1986 (30.10.86), claims 1-5; fig. 1-5.	1

ANHANG

zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

ANNEX

to the International Search Report to the International Patent Application No.

ANNEXE

au rapport de recherche international relatif à la demande de brevet international n°

PCT/GB 93/01410 SAE 76241

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The Office is in no way liable for these particulars which are given merely for the purpose of information.

La présente annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche international visée ci-dessus. Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsibilité de l'Office.

Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
DE A1 3122064	18-03-82	BE A1 889090	01-10-81
		BR A 8103621	02-03-82
		DE C2 3122064	21-05-87
		FR A1 2484001	11-12-81
		FR B1 2484001	23-11-84
		GB A1 2080390	03-02-82
		GB B2 2080390	11-04-85
		IE B 51053	17-09-86
		IL A0 62983	31-07-81
		IL A1 62983	28-02-85
		IT A0 8122211	09-06-81
		IT A 1168094	20-05-87
		JP A2 57074481	10-05-82
		NL A 8102751	04-01-82
		PT A 73157	01-07-81
		PT B 73157	19-08-82
		SE A 8103559	10-12-81
		US A 4416127	22-11-83
		ES A1 492254	16-05-81
		ES A1 8105434	16-08-81
		ES A5 492254	16-06-81
AT B 361798	25-03-81	AT A 1740/79	15-08-80
		AU A1 45350/79	04-10-79
		AU B2 519693	17-12-81
		BE A1 875155	16-07-79
		BR A 7901895	27-11-79
		CA A1 1150524	26-07-83
		CH A 627513	15-01-82
		DE A1 2818730	11-10-79
		DK A 1261/79	30-09-79
		ES A1 478729	01-07-79
		ES A5 478729	10-07-79
		FR A1 2421257	26-10-79
		GB A1 2018347	17-10-79
		GB B2 2018347	28-04-82
		IL A0 56891	31-05-79
		IL A1 56891	31-12-81
		IT A0 7921137	20-03-79
		IT A 1111268	13-01-86
		JP A2 54134000	18-10-79
		MX A 148211	25-03-83
		NL A 7902029	02-10-79
		NO A 791011	02-10-79
		SE A 7902397	30-09-79
		SE B 429248	22-08-83
		SE C 429248	01-12-83
		US A 4257030	17-03-81
		ZA A 7901283	26-03-80
FR A1 2561703	27-09-85	FR B1 2561703	25-07-86
FR A1 2669368	22-05-92	EP A1 557461	01-09-93
		WO A1 9208864	29-05-92
DE A1 3244566	14-06-84	keine - none - rien	
FR A1 2441036		DE A1 2847730	14-05-80
		FR A2 2441036	06-06-80
		GB A1 2035441	18-06-80
		GB B2 2035441	21-07-82
		IT A0 7969142	02-11-79

			IT	A	1119563	10-03-86
			JP	A2	55065679	17-05-80
			US	A	4274080	16-06-81
DE A1	2752106	23-05-79	CH	A	640297	30-12-83
			FR	A1	2409556	15-06-79
			GB	A1	2012343	25-07-79
			GB	B2	2012343	15-04-82
			IT	A0	7829949	20-11-78
			IT	A	1101623	07-10-85
			JP	A2	54099600	06-08-79
			US	A	4298792	03-11-81
			DE	A1	2843359	24-04-80
			US	A	4237375	02-12-80
			DE	A1	2747076	26-04-79
			DE	B2	2747076	27-09-79
			DE	C3	2747076	04-10-84
			FR	A1	2406854	18-05-79
			FR	B1	2406854	20-06-86
			GB	A1	2009477	13-06-79
			GB	A1	2086110	06-05-82
			GB	B2	2009477	09-06-82
			GB	B2	2086110	15-12-82
			IT	A0	7828974	20-10-78
			IT	A	1099424	18-09-85
			JP	A2	54102832	13-08-79
			JP	B4	62007586	18-02-87
			DE	A1	2843462	17-04-80
			DE	C2	2843462	06-02-86
FR A1	2356790	27-01-78	DE	A1	2629346	05-01-78
			DE	B2	2629346	20-12-79
			DE	C3	2629346	21-08-80
			GB	A	1545141	02-05-79
			SE	A	7707535	31-12-77
DE A1	3514149	23-10-86	keine - none - rien			